WHAT IS CLAIMED IS:

1. An optical waveguide comprising:

a partial cylindrical portion, said partial cylindrical portion having an elongated profile, and being formed of a material transparent to a light propagating along said partial cylindrical portion; and

a plurality of end portions, each of said plurality of end portions having an approximately partial spherical profile smoothly joining said partial cylindrical portion, and being formed of a same material as a material of said partial cylindrical portion, whereby the light propagates along said partial cylindrical portion and said plurality of end portions and is totally reflected at a boundary surface contouring said partial cylindrical portion and said plurality of end portions.

2. An optical waveguide according to claim 1, wherein said partial cylindrical portion includes a curved part having an approximately partial spherical profile smoothly joining a pair of straight partial cylindrical parts of said partial cylindrical portion.

3. An optical waveguide according to claim 1, wherein said partial cylindrical portion includes a crossing part having an approximately partial spherical profile smoothly joining a plurality of straight partial cylindrical parts of said partial cylindrical portion.

4. An optical waveguide according to claim 1, further comprising a cladding portion, said cladding portion being in contact with at least a part of a core consisting of said partial cylindrical portion and said plurality of end portions, and being formed of a material whose refractive

index is lower than a refractive index of said core.

5. An optical waveguide according to claim 4, wherein said cladding portion includes a flat substrate, which is in contact with at least a part of a flat boundary surface of said core.

6. An optical waveguide according to claim 5, wherein said partial cylindrical portion, said end portions and said substrate are formed such that light perpendicularly incident to said substrate through said plurality of end portions propagates along said partial cylindrical portion.

7. An optical waveguide according to claim 5, wherein said partial cylindrical portion, said plurality of end portions, and said substrate are formed such that light propagating along said partial cylindrical portion emerges perpendicularly to said substrate through said plurality of end portions.

8. An optical waveguide according to claim 1, wherein said partial cylindrical portion and said plurality of end portions are formed of a resin material.

9. An optical waveguide according to claim 1, wherein said partial cylindrical portion and said plurality of end portions are formed of a glass material.

10. An optical waveguide according to claim 1, wherein said partial

cylindrical portion and said plurality of end portions are formed on one of a resin substrate, a glass substrate, a quartz substrate, and a semiconductor substrate.

11. An optical waveguide according to claim 10, wherein said substrate comprises a flexible substrate.

12. An optical interconnection device comprising:

a waveguide including a partial cylindrical portion, which has an elongated profile, and is formed of a material transparent to a light propagating along said partial cylindrical portion; and a plurality of end portions, each of said plurality of end portions having an approximately partial spherical profile smoothly joining said partial cylindrical portion, and being formed of a same material as a material of said partial cylindrical portion, whereby the light propagating along said partial cylindrical portion and said plurality of end portions is totally reflected at a boundary surface contouring said partial cylindrical portion and said plurality of end portions; and

a substrate with at least one of a light emitting device and a light receiving device disposed on said substrate, said plurality of end portions of said waveguide being positioned at a portion of said substrate corresponding to a position at which said light emitting or receiving device is disposed.

13. An optical interconnection device according to claim 12, wherein said light emitting device comprises a surface emitting laser, which is composed of semiconductor crystal and includes an active layer

sandwiched between a pair of reflective mirrors.

14. An optical interconnection device according to claim 12, wherein said light emitting device comprises a light emitting diode (LED), which is comprised of a semiconductor crystal material and includes one of a pn junction and a pin junction.

15. An optical interconnection device according to claim 12, wherein said light receiving device comprises a pin photodiode, which is composed of a semiconductor crystal material.

16. An optical interconnection device according to claim 12, wherein said light receiving device comprises a metal-semiconductor-metal (MSM) optical detector, which is composed of a semiconductor crystal material.

17. An optical interconnection device according to claim 12, wherein said substrate comprises a semiconductor substrate on which an electronic circuit for driving and controlling said light emitting device is integrated, and said light emitting device is coupled with said semiconductor substrate.

18. An optical interconnection device according to claim 12, wherein said substrate comprises a semiconductor substrate on which an electronic circuit for amplifying and controlling said light receiving device is integrated, and said light receiving device is coupled with said semiconductor substrate.

19. An optical interconnection device according to claim 12, wherein said waveguide optically connects semiconductor circuit chips, each of which is formed on said substrate.

20. An optical interconnection device according to claim 12, wherein said waveguide optically connects chip modules in which a plurality of semiconductor circuit chips are implemented.

21. An optical interconnection device according to claim 12, wherein said waveguide performs an optical wiring on a circuit board in which a semiconductor circuit chip and a chip module are implemented in a mixed configuration.

22. An optical interconnection device according to claim 12, wherein said waveguide optically connects circuit boards in which a semiconductor circuit chip and/or a chip module are implemented.

23. A method of fabricating a waveguide, which includes a partial cylindrical portion, which has an elongated profile, and is formed of a material transparent to a light propagating along the partial cylindrical portion; and a plurality of end portions, each of said plurality of end portions having an approximately partial spherical profile smoothly joining the partial cylindrical portion, and being formed of a same material as a material forming the partial cylindrical portion, whereby the light propagating along the partial cylindrical portion and the plurality of end portions totally reflects at a boundary surface contouring the partial cylindrical portion and the plurality of end portions, said

method comprising the steps of:

fabricating a mold; and

molding a waveguide material into a waveguide by using the mold.

24. A method according to claim 23, wherein the mold is fabricated by a method comprising the steps of:

(a) preparing a substrate at least a portion of which is an electrically-conductive portion;

(b) forming an insulating mask layer on the electrically-conductive portion of the substrate;

(c) forming an opening, at least a part of which is a slit-shaped portion, in the mask layer to expose the conductive portion of the substrate at the opening;

(d) performing electroplating using the electrically-conductive portion of the substrate as a cathode to deposit a partial cylindrical plated layer in the opening and on the mask layer;

(e) forming the mold on the substrate with the plated layer; and

(f) separating the mold from the substrate with the plated layer.

25. A method according to claim 24, wherein in said step (d), a size of the partial cylindrical plated layer is controlled by controlling an electroplating time and temperature.

26. A method according to claim 24, wherein in said step (d), a sacrificial layer is formed on the plated layer.

27. A method according to claim 24, wherein in said step (e), the

mold is formed by electroplating.

28. A method according to claim 26, wherein in said step (f), the mold is separated from the substrate with the plated layer by removing the sacrificial layer.

29. A method according to claim 24, wherein in said step (f), the mold is separated from the substrate with the plated layer by serially etching the substrate and the plated layer.

30. A method according to claim 24, wherein in said step (a), the substrate comprises a Si wafer.

31. A method according to claim 24, wherein in said step (b), the mask layer is formed of a photoresist.

32. A method according to claim 24, wherein in said step (c), the opening is patterned corresponding to a profile of the waveguide.

33. A method according to claim 24, wherein the waveguide is formed of a resin material.

34. A method according to claim 24, wherein the waveguide is formed of a glass material.

35. A method according to claim 24, wherein the waveguide is formed on one of a resin substrate, a glass substrate, a quartz substrate, and

a semiconductor substrate.

36. A method according to claim 35, wherein said substrate is a flexible substrate.

37. An optical waveguide comprising:

a first region having a partial cylindrical profile; and

a second region having a curved profile.

38. An optical waveguide according to claim 37, wherein said first region comprises an end portion, and said second region is provided at said end portion of said first region.

39. An optical interconnection device comprising:

a light emitting device;

a light receiving device; and

an optical waveguide for optically connecting said light emitting device and said light receiving device, said optical waveguide including a first region having a partial, cylindrical profile, and a second region having a curved profile.

40. A method of fabricating a mold for molding a material of an optical waveguide, said method comprising the steps of:

(a) preparing a substrate at least a portion of which is electrically conductive;

(b) forming an insulating mask layer on the conductive portion of the substrate;

(c) forming an opening in the mask layer;

(d) forming a plated layer in the opening and on the mask layer;

(e) forming the mold on the plated layer; and

(f) separating the mold from the substrate with the plated layer.